

## Claims

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What is claimed is:

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1. The method for forming embolus in capillary blood vessels in tumor by ultrasonic radiation micro-bubble reagent, wherein ultrasonic micro-bubble reagent as the reagent to form embolus in capillary bloods vessel through injection, so it can be applied as medicine to treat cancer, by closely irradiating the area where capillary embolus need to be formed with ultrasonic wave, selectively induce to form capillary blood vessel embolus in the certain area.

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2. The method of claim 1, wherein low frequency and low energy ultrasonic wave is applied, time period for handling is 0.5-60 minutes, frequency 20-50kHz, output power of the ultrasonic energy transforming device is about 0.3-3W, injection of ultrasonic micro-bubble reagent is 1-10ml per kg of the body.

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3. An ultrasonic radiation micro-bubble reagent, wherein medical used ultrasonic micro-bubble reagent includes Florin carbon micro-bubble reagent, medical salt- water base micro-bubble reagent and any other types of ultrasonic micro-bubble reagent listed as below:

1)Albunex (Molecular Biosystems Inc.USA)

2)fso69 (Molecular Biosystems Inc.USA)

3)SHU454 (ScheringAG German)

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4)SHU508 (ScheringAG German)

5)QW3600 (Sonus Pharmaceuticals Cosla Mesa)

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6)Carbon dioxide type micro-bubble reagent including choosing large molecule substance as the carrier of the reagent to wrap, stick, stablize and bring the bubbles; large molecule substances include every kinds of substitute blood plasma, blood and plasma of the body, plasma of the same type, Semi-lactose, Glucose, Lactose, Hetastarch, Human Serum Albumin,Dextran-

70,Dextran-40,Dextran-10,Polygeline,Gelofusine,Poly-vidone or  
Dxypolygelatin.

- 5 4. The ultrasonic radiation micro-bubble reagent of claim3, wherein carbon dioxide gaseous micro-bubble reagent is produced by physical way, carbon dioxide gas or liquid is added into solution with large molecule substance under pressure.
- 10 5. The ultrasonic radiation micro-bubble reagent of claim3 or claim 4, wherein it applies organic acid and  $\text{NaHCO}_3$  to react to get micro-bubble reagent; Organic acid includes: Vitamin C, Lactic acid, Citric Acid, Amber acid, Tartar Acid, Lactose acid, Semi-lactose acid, Glucose acid, Amino glucose acid, Amino acid, etc. For medicine use, Lactic acid, Citric acid, Glucose acid, Amido Glucose acid or Amino acid .
- 15 6. The ultrasonic radiation micro-bubble reagent of claim3 or claim4, wherein the weight ratio of Organic acid,  $\text{NaHCO}_3$  and large molecule substance in the micro-bubble reagent is: 10-35:2-3.5:20-80, , and the ratio the solvent and solid content is 3-10.
- 20 7. The ultrasonic radiation micro-bubble reagent of claim3 or claim4, wherein it includes marking or tracing isotope micro-bubble reagent with targeting substances which is the mixture or combination of ultrasonic micro-bubble imaging reagent with marking or tracing isotope with targeting substance; marking or tracing isotope micro-bubble reagent with targeting substance includes:  $^{125}\text{I}$ 、 $^{123}\text{I}$ 、 $^{99\text{m}}\text{Tc}$  (  $^{99\text{m}}\text{Tc-PYP}$ ,etc ) 、 $^{111}\text{In}$ 、 $^{11}\text{C}$ 、 $^{18}\text{F}$ 、 $^{13}\text{N}$ 、 $^{82}\text{Rb}$ ; natural existing element marking radioactivity medicine as the positron integration radioactivity nuclide  $^{11}\text{C}$ 、 $^{13}\text{N}$ 、 $^{15}\text{O}$ 、 $^{18}\text{F}$  can be applied in PET imaging; tracing or marking isotope with targeting substance simultaneously with treatment function includes:  $^{32}\text{P}$ 、 $^{35}\text{S}$ 、 $^{198}\text{Au}$ 、 $^{99\text{m}}\text{Tc}$  (  $^{99\text{m}}\text{Tc-PYP}$ ,etc ) 、 $^{111}\text{In}$ 、 $^{125}\text{I}$ and  $^{131}\text{I}$ 、 $^{153}\text{Sm}$  - EDTMP mainly  $\beta$  injection treatment substance ,  $^{90}\text{Y}$  - GTMS、 $^{89}\text{SrCl}_2$ ,etc.
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8. The ultrasonic radiation micro-bubble reagent of claim3 or claim4, wherein targeting substance combined with isotope includes: Human Serum Albumin ( $^{99m}\text{Tc}$ -MAA), Floral sodium, Colloid  $^{113m}\text{In}$ , Marking Erythrocyte, EHIDA,  $^{99m}\text{Tc}$  - PMT,  $^{131}\text{I}$ -rose, DTPA, EHIDA,  $^{99m}\text{Tc}$ -DMSA, Calcium  
5      Gluconate, O-iodohippuric acid, especially include molecular nucleus medical sole clone antibody, Oncogene antisense oligonucleotides.
9. The ultrasonic radiation micro-bubble reagent of claim8, wherein micro-bubble reagent includes florin-carbon type, medical salt -water type, semi lactose bubble liquid type, envelope bubble liquid type, carbon dioxide generating  
10      type and selecting of large molecule substance as the carrier of ultrasonic reagent to wrap, stick, stabilize and carry the bubbles.
10. A medical device using ultrasonic micro-bubble imaging reagent to form capillary vessel embolus, wherein the device is comprised of ultrasonic micro-bubble imaging reagent injecting part, local positioning part and ultrasonic  
15      treating part; ultrasonic micro-bubble imaging reagent injecting part injects ultrasonic micro-bubble imaging reagent as the embolizing reagent, local positioning part is to position the location where capillary blood vessel embolus need to be formed, ultrasonic treatment part is an ultrasonic energy output head; The range of output energy and output frequency of this ultrasonic treating  
20      device is: Frequency 20-50kHz, output power of Ultrasonic energy transformer:1-100W.
11. The device of claim10, wherein the local positioning device is B Ultrasonic or X-Ray, CT or ECT, etc.
12. A hand-held ultrasonic treatment head with coupling and buffer protection  
25      device is comprised of metal treating head (1), electrode patch (3), ceramic patch (4), range change rod (4-1), counter weight (5), power route (6), handler (7), terminal (8,8-1), a covered water purse (14-1) is mounted on the treatment head.

13. The hand-held ultrasonic treatment head of claim 12, wherein said ultrasonic treatment head protrudes from the terminal, the water purse (13) covers the terminal and the water purse is made of latex.

14. The hand-held ultrasonic treatment head of claim 12 or claim 13, wherein it further includes a drainage connection (2) on the terminal.

### Abstract

A tracing or marking isotope micro-bubble reagent with targeting substance, the combination or mixture of ultrasonic micro-bubble imaging reagent with tracing or marking isotope. The tracing or marking isotope includes generally medical used isotopes. The micro-bubble reagent includes fluoro-carbon type, medical salt water type, semi lactose bubble liquid type, envelope bubble liquid type and carbon dioxide generating type. Large molecule substance is selected as the carrier of ultrasonic reagent to wrap, stick, stabilize and carry the bubbles. The tracing or marking isotope micro-bubble reagent with targeting substance is applied to position the tumor area in the treatment of tumor by using low frequency, low energy ultrasonic to induce the cavitation effect of micro-bubbles to form thrombus embolus in blood vessels, Meanwhile, radial  $\beta$  isotope is applied to radiate the tumor cells by using the ionizing radiation biological effect thereof.

